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Education for Sustainable Development Pedagogy: Criticality, Creativity, and Collaboration

Edited by Lynne Wyness

PedRIO paper 8

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Education for Sustainable Development Pedagogy: Criticality, Creativity, and Collaboration

PedRIO Occasional Paper 8

April 2015



Edited by Lynne Wyness

**CENTRE FOR
SUSTAINABLE
FUTURES
WITH
PLYMOUTH
UNIVERSITY**

We planned this conference in anticipation of the end of the UN Decade of Education for Sustainable Development (DESD), and the start of the next phase for those involved in ESD here and internationally. At Plymouth University, 2015 marks a ten year anniversary since cross-institutional work on sustainability and sustainability education was spearheaded by the founding of the Centre for Sustainable Futures (CSF). Coincidentally, 2015 also marks ten years since the influential HEFCE policy document 'Sustainable Development in Higher Education' was released.

Holding the conference in January – named after the Roman god of doorways, of endings and beginnings – we sought to look at some of what has been achieved in sustainability education to date and explore its prospects as we move forward.

Following an enthusiastic response to the call for abstracts, the conference featured a diverse range of research papers, posters, and roundtable presentations from academics and practitioners across the UK and beyond. The conference was arranged around three overarching themes:

ESD Pedagogy: Criticality, Creativity, and Collaboration

What are the teaching and learning processes that enable students to develop their own capacity to think critically and creatively in the face of global sustainability challenges and, secondly, to act collaboratively in ways that pursue more hopeful and sustainable futures?

Innovative Learning Spaces for ESD

What are the physical environments that provide opportunities for new forms of sustainability education to flourish? What lies beyond the lecture hall that is conducive to student learning through inquiry-based, active, participatory, interdisciplinary and experiential methods?

Towards the Sustainable University

What are effective approaches for leading institutional change, organisational learning, and staff CPD towards sustainability?

This publication focuses on the first of these themes – **ESD Pedagogy: Criticality, Creativity, and Collaboration**. There will be a further PedRIO Occasional Paper 9 that looks at Innovative Learning Spaces for ESD and Towards the Sustainable University.

We wish to thank all of the presenters and delegates who together made this a memorable and inspiring conference.

Paul Warwick, Stephen Sterling, and Lynne Wyness
Centre for Sustainable Futures,
Plymouth University

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So far, so good – and so what? ESD and the next decade

Stephen Sterling, Plymouth University, UK

In my keynote, I attempted to give a brief and personal perspective on achievements and prospects of Education for Sustainable Development (ESD) in Higher Education, as someone who has been involved in the field for many years. I started by mentioning my own entry points, including the UN Conference on the Human Environment 1972, which was the first international conference to identify education as a key means of addressing environmental issues. An abbreviated version of the talk follows....

What legitimates this approach to education is context. Numerous high level reports and books consistently remind us that, in the words of Al Gore's latest book *The Future* (2012:xv) there is:

a clear consensus that the future now emerging will be extremely different from anything we have ever known in the past.

Similarly, a recent Foresight report from UNEP (2012:3) stated that:

We are moving into a world that differs in fundamental ways from the one we have been familiar with during most of modern human history. This transition has profound consequences.

These kinds of reports have spurred ESD and sister movements for decades – not only during the UN Decade of ESD we have just experienced.

So what has happened in environmental and sustainability education in this time? Clearly a huge amount, and looking at it historically, it is remarkable that an educational movement has had such impact in little more than a quarter century, even given its antecedents in Environmental and Development Education. However, at the same time, whole chunks of higher education policy and practice are not only not responding to the crises and opportunities of sustainability, but arguably making things more problematic by default.

November 2014 saw the UNESCO World Conference on ESD in Nagoya, marking the end of the DESD. As part of the preparative process for the Nagoya conference, I was asked by UNESCO to write a paper on the response of the education community to sustainability, and the sustainable development community to education and learning (Sterling 2014). In brief, the paper looked at what I call a 'deficit problem': despite real advances in the 40 years I've been working in the field, and the appearance of all kinds of new initiatives, networks and partnerships, there is still a long way to go before education really fully embraces these issues.

So what's going on? How can education be part of the solution rather than perpetuating the problem? What kind of education is appropriate for the kinds of conditions we find ourselves experiencing, and how can this best be brought about? How can we be sufficiently radical and far-reaching, but also realistically practical?

The UNESCO 'End of Decade' Report launched at the Nagoya conference talks about the need for 'a global rebooting of higher education towards sustainable development'. It suggests that this will

need 'more than the alignment or scaling up of existing good practice. To transform the curricula and pedagogy at the core of their higher education experiences requires deeper innovation in staff development and across institutions' (UNESCO 2014a). At the same conference, UNESCO launched its 'Global Action Plan for ESD' (GAP) which advocates – under one of its Priority Actions – whole institutional approaches to sustainability (UNESCO 2014b).

What is missing in these high level documents, however, is critical analysis of existing policies and practices in HE - the kind of analysis which shows why a whole institutional response and a 're-booting' is desirable. There is however, evidence of a new energy in the area of ESD and sustainability. For example, nearly 300 HEIs across the world – including Plymouth - have signed up to the Rio+20 Higher Education for Sustainability Initiative; the Sustainability Literacy Test (SLT) is taking off internationally; and ten of the world's leading research universities have launched a comprehensive 'Green Guide for Universities' (IARU 2014). And so on, all good news. But, as noted, there is rather less critique of current paradigms, purposes, practices, in other words, the prevailing culture.

Without critical reflection on HE purposes, policy and practice, the renewed interest in ESD and sustainability might be seen metaphorically as constructing an eco-house but on old foundations, which are themselves not examined to see if they are fit for new purposes and a new environment. Some of them certainly will be fine, but some of them are not. A recent US book (Bartlett and Chase, 2013) does recognise that sustainability cannot just be some kind of overlay or bolt-on.... and rather, implies that sustainability needs to be part of the foundations. But what does this mean? And what does the GAP's advocacy of whole institutional change imply?

Meantime, the new HEFCE framework for SD in HE misses entirely the *whole institutional change* theme that previous versions endorsed, ignores organisational learning and hardly recognises teaching and learning. Which is regrettable given the huge positive potential benefit to recruitment, quality, motivation, engagement, reputation, and relevance that this agenda has.

Of course, it does take time, as we know. We can envisage a *spectrum of change* – from universities that have not even begun this journey, to those that show what might be called a 'first wave response', through to a more transformative interpretation and operation. The latter is demanding, ambitious and difficult and corresponds to what Arjen Wals and John Blewitt (2010:55) call a 'third wave response':

...a university's attempt to re-orient teaching, learning, research and university community relationships in such a way that sustainability becomes an emergent property of its core activities

In 2014, I was involved in this work at universities in the UK, in Switzerland, Belgium and Australia, and what is very clear is that, first, there is a renewed interest in this agenda and, secondly, that structured learning – that is the programmes and provision that the university offers - is really dependent on the degree to which institutional learning or organisational learning towards a third wave response occurs.

This movement is still underway at Plymouth. We have done very well – and average out as top position in the People and Planet Green League and won three Green Gown Awards in 2014. We've been very fortunate to have had a change and support team in CSF - embedded within PedRIO, our

pedagogic research institute. We developed a 'four C' holistic model of Campus, Community, Curriculum and Culture back in 2005, and this has informed a systemic change programme since. We tried to develop a clear idea of what a shift towards a more sustainable university might mean, not least, attempting to break down the compartmentalisation that so often characterises university structures. This has included an integrative structure through which we could monitor work and opportunities across the three areas of *operation and estates*; *teaching and learning*; and *research*, and this approach is reflected in the university's Sustainability strategy.

There is a good deal that is moving in the right direction, and more detail can be gleaned from this conference report, from our new Plymouth University Sustainability Report <https://www.plymouth.ac.uk/your-university/sustainability>, and from our sustainability pages <https://www.plymouth.ac.uk/your-university/sustainability/sustainability-education>. There is always more to be done in the quest for a more sustainable university however.

In conclusion, and with regard to my title, there are 'reasons to be cheerful'. HE has come a long way with regard to sustainability agenda. There is growing recognition of the importance, relevance and potential of this agenda across the sector. At Plymouth we have a good story to tell, as do many of those HEIs represented at this conference. But is it sufficient?

There is still a disjoint between common purposes and practices in HE, and the unprecedented global trends and issues in the wider world which are already facing our graduates, and which the proposed Sustainable Development Goals (SDGs) seek to address. So, whilst being heartened by what has been achieved, we need to go on and engage more and more of our colleagues and students – actively, creatively, and respectfully building on current interests, enthusiasms, and commitment so that HE is able to rise fully to its responsibilities in this area. In so doing (and this is a phrase I came across recently), we will be 'doing what the future requires of us'.

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Team Projects, inquiry, and sustainable development: an example in the computing curriculum

Neil Gordon, University of Hull, UK

Introduction

We consider how Sustainable Development (SD) can provide a framework to unify and motivate the development of graduate attributes and transferrable skills in the context of discipline-based teaching. We also consider pedagogic approaches to engage students. Whilst the illustration of the approach is through a case study from Computer Science utilising appropriate pedagogic approaches that are transferrable to other disciplines.

There is a growing focus on graduate attributes within Higher Education. These can include elements of sustainability literacy and energy literacy, as well as more traditional transferrable skills. The final element of the approach described here is the use of team work; the problem-based approach is done in teams, with a range of sub-problems to allow the team to subdivide tasks and also learn about project management and the issues that arise in coordinating across tasks and individuals. The effective use of teamwork in teaching and, in particular, in assessment will be explored, with a description of the need for effective expectation management, and of mechanisms to audit and track team work issues. Appropriate tasks can encourage and / or require that students demonstrate critical evaluation – with consequential benefit to the skills development of the students. We will describe how the use of peer-assessment can assist in motivating students – both those who may typically sit back and let others work, as well as letting those who fear being the workhorse being exploited by the rest of the group. Such mini-social frameworks can provide a microcosm of a sustainable society, thus reinforcing the intended learning outcomes.

IT and computer systems are increasingly recognised as having a significant impact on the environment. These systems also affect society - with impacts on how people live, interact, and increasingly how governments manage and interact with their citizens. Considering the future careers of our students, commercial organisations are affected - with carbon taxes and other initiatives to modify their behaviour, so ensuring that our students appreciate that some of these aspects are preparing them for work. We can encourage our students to consider how Computer Science can offer solutions to many aspects of the challenges faced - both to the IT systems themselves and as a mechanism to reduce the impact of other activities, such as improving supply chains, transport systems and thereby reducing the more significant causes of pollution.

Pedagogic Approaches

One approach to make SD more engaging and effective is Problem and Inquiry Based Learning. Problem and inquiry based learning offers ways to get students to engage with assessment activities (Brayshaw & Gordon, 2008). Setting authentic tasks can assist students in appreciating the broader context of their discipline and give them the opportunity to apply their subject specialisms in real-world (like) contexts. SD-related problems can be particularly attractive from this perspective. Team-based activities have benefits of encouraging students to engage with their studies, improving their

social and practical (i.e. transferrable) skills, and allowing students to focus on those parts of a problem that interest them the most (Gordon, 2010).

Team-based work in HE remains a point of contention – with staff and students frequently exhibiting concerns and reservations, in particular around fairness, ‘free-riders’, and how to audit and track team-work.

A technology that can assist in the last point is Teamware, which may be provided through a Virtual Learning Environment (VLE)’s group activity tools, available Web 2.0 online facilities such as GoogleDocs, or by utilising industry tools such as SharePoint. Such tools can provide ways to encourage students to collaborate virtually, thus offering the opportunity for pure online, or blended, approaches to this problem based activity.

Assessment and allocating marks is another issue within team work; mechanisms are needed to allow staff (or other student teams) to assess team outputs, but not to have to investigate individual contributions in general. Using computer technologies such as WebPA (2014) allows students to submit scores of relative contribution, and allows staff to collate the data to assign individual marks based on team work in a way that students generally find fair and acceptable.

Case Study

We now consider a case study utilizing the above approaches to integrate and motivate sustainable development. This Level 4 (year 1) module on IT and Professional Skills has approximately 200 students. The Sustainable Development content is supported following a more general introduction to the concepts of legal, social, ethical and professionalism in computing. This is followed with example material of sustainable issues that are assessed initially via computer-based test, and followed up with a group project.

In terms of the teams – there are typically ten students per team, with team (SharePoint) sites to manage content and submissions. Teams are given five weeks of lab time to investigate, self-manage, and submit a collective solution. The task is essentially to manage a multi-deliverable based problem: given a scenario of acting as IT consultants, each team is given unique data (generated from a set of parameters) and has to produce an analysis and IT solution for a PC manufacturing company. Deliverables include spreadsheet models of production and the corresponding energy, with reports analysing how to make the company more effective and how to best reduce its carbon footprint. The assignment ends with a presentation and at this point the students submit their own scores indicating relative contributions via WebPA. The students address ethical and environmental aspects, as professional computer scientists within the legal framework.

Mapping the professional attributes expected onto the pillars of Sustainable Development is illustrated in Figure 1.

Conclusions

Sustainable Development offers a way to contextualise the social and professional skills and graduate attributes, and provides a basis for problems that allow authentic assessment. Utilising appropriate pedagogic approaches can make sustainable development topics more engaging, especially when supported with tools for group work and peer assessment.

Figure 1: Sustainable Development as a framework for Legal, Social, Ethical and Professional issues (adapted from Gordon, 2014)



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The key role of group facilitation in the collaborative social pedagogy necessary for deliberate social transformations toward global sustainability

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Introduction

This paper describes a co-curricular learning programme called Collaborative Leadership for Sustainability (CLS), which has been offered for the last two years by Plymouth Business School PBS). This programme emerged from and contributes to the Sustainable Futures Protocol (SFP), which is part of an emergent global research network for social transformations toward sustainability that seeks to profile and develop the optimum competences and best practices for participation and collaboration in community-based sustainability initiatives (Wensing, 2012; Wensing, Hurth & Virgo, 2015). In particular, this paper discusses the key role of facilitation in education for sustainability as well as in real-world collaborative action on issues of sustainability such as climate change adaptation.

Background

Collaboration to integrate knowledge and develop community-based action strategies on climate change is vital to generating sustainable futures. However, collaboration across cultural boundaries, differences in expertise, worldviews, and values is not easy. Early research at Harvard University has shown the trust between collaborators, the salience of the knowledge being integrated, and developing legitimacy within the context of the community are key targets for reaching consensus agreements on action strategies on sustainability (Cash et al., 2003). More recently, researchers have begun to search for key competences for leadership and participation in these initiatives, and have suggested that the most critical are social competences related to the mediation, translation, and implementation of knowledge (Wiek et al., 2011). In our research, we are seeking to define and develop exactly what those social competencies are. To date, our work has begun to reveal an idealized set of both interpersonal and intrapersonal psychological and sociocultural competences (Wensing, Hurth, & Virgo, 2015). Taken together these competences describe what can be viewed as an 'Identity in Sustainability.' In addition, we have begun to explore and demonstrate the key role of facilitation in collaboration. Our research suggests that facilitation is highly effective in addressing complex sustainability issues and in simultaneously helping to develop the competences for collaboration, the 'sustainability identity', for taking effective and ethical social action on them.

CLS in Plymouth

The CLS course was advertised to PBS and Plymouth Graduate School of Management (PGSM) students as part of the Talent Hub co-curricular programme. It consists of ten workshops, spaced over six months. As well as attending workshops, students participate in a chosen community-based project and are encouraged to keep a reflective journal throughout the course.

The CLS learning experience is multi-layered. Firstly, there is delivered content on the theories and interpretations about sustainability, collaboration, leadership, and change. Second, there are facilitated individual learning and group discussion activities, which are designed to enable participants to understand the content at a deeper level and to reflect on it in the context of their

own experience (e.g. Brockbank & McGill, 2007). Finally, there is the role that the teacher-as-facilitator plays in creating and maintaining a purposeful collaborative learning group that enables individuals to learn through experience how it is to be collaborative, be sustainability and be aware of both of these. The facilitated elements that contribute to this third layer can be divided into three categories: collaboration, identity and awareness.

Collaboration

Early in the programme, the students are invited to experience the consensus workshop, a powerful tool for collaboration (Stanfield, 2002). The consensus workshop takes the ideas and priorities of each individual and uses a combination of rational and intuitive processes to discern and articulate the agreement that exists within that set of ideas. In doing this, participants become aware of a way of thinking and being that is inherently collaborative – which focuses on the agreement that is already present, rather than the details where agreement is yet to be reached. The consensus workshop builds trust and deepens understanding, enables participants to understand diverse viewpoints and become aware of the ways in which different perspectives are connected with their own.

Identity

Participants are invited to come into contact with their own self-concept in a variety of ways. Early in the programme, Accomplishment Introductions encourage students to identify with their achievements, those aspects of their experience, which give meaning to life (Cooperrider, Whitney, & Stavros, 2008). Later on, students are invited to reflect on those aspects of their identity, which are most equitable with a sustainable future, and challenged to construe an identity in sustainability.

Awareness

Awareness became a significant feature of the Plymouth course even though it had not been planned as such. After introducing Perls' Now I Am Aware activity (Barton, 2000), it became apparent that the skill of becoming present was one which students valued and wanted the opportunity to learn and indeed, the literature identifies this as a core competence for sustainability leaders (Baan, Long, & Pearlman, 2011; Brown, 2012).

Facilitation

One factor that is emerging in research seeking to idealize collaboration for sustainability is the role of facilitation. This includes its role in the development of community leaders (de Vreede, Warner & Pitter, 2014; Hanson, 2013), social learning (Holden, Esfahani, & Scerri, 2014), and the overall collaborative processes (Marcy, Benavides, & Brown, 2011).

There are many definitions of facilitation (see e.g. Heron, 1993; Hogan, 2002), but for us, the facilitator role (i) Focuses on process, not content delivery; (ii) Models and maintains the conditions for collaborative inquiry; and, (iii) Manages the integrity of the interactions by ensuring that each person is heard and has the opportunity to understand and assimilate the content of the conversation. The teacher-as-facilitator is critical in the CLS in guiding a social learning process which includes value inquiry and the creation of a shared identity in sustainability.

Whilst the role of facilitator is content-neutral, it is not value-neutral. Indeed, it can be argued that no intervention is ever value-neutral (Rands, 2009). The facilitator value-base is crucial to the impact

of the role (Hogan, 2002). By allowing certain values to inform her or his interventions, the facilitator enables individuals to experience being in a group in a particular way. For example, consciously creating an environment which is inclusive, collaborative and solution-oriented enables students to experience themselves operating in this way.

Findings

Five key findings emerged from the 2013-14 cohort study in relation to the role of facilitation in learning for sustainability:

- Facilitation helps to build trust between participants.
- Facilitation enables students to experience the values, attitudes, and behaviours optimal for global sustainability.
- The teacher-as-facilitator brings models and thinking tools which help participants to evolve and adapt solutions.
- The facilitation process utilized in the SFP appears to reify an identity in sustainability both at the collective and individual levels.
- Facilitation contributes to self and other-awareness.

Conclusion

Further research is required into the role of group facilitation in experiential social learning and its potential for enabling students to both experience a collaborative way of being and explore an identity consistent with sustainability. In particular, the value-base, beliefs, assumptions, and behaviour of the facilitator would seem to be key to this process and are relatively unexplored in the literature. In general, the key role of the facilitator in helping generate sustainable futures seems irrefutable.

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Informal learning on campus: a comparative study of students' energy literacy in UK universities

Debby Cotton, Jennie Winter, Wendy Miller, and Reema Muneer, Plymouth University, UK

Introduction

Higher Education (HE) has a key role to play in educating 'leaders for the future' (Martin and Jucker, 2005), and there is an increasing expectation that graduates should be equipped with the knowledge, skills and attitudes to enable them to respond to sustainability challenges. Whilst many students are exposed to sustainability through university curricula, there is significant variation depending upon course studied. Nonetheless, there are some signs that universities are integrating sustainability concerns more widely into research, campus operations, and community relations – enhancing opportunities for informal learning across the disciplines (Sterling et al., 2013). At least in the UK, there is also some evidence of a correlation between participation in HE and subsequent commitment to environmental sustainability when other factors are held constant (Cotton & Alcock, 2012).

Informal learning is understood to mean '*...learning from other people outside the formal educational context and in a range of different locations*' (Ryan and Cotton, 2013). It is largely invisible, may not be recognised as such by the learners, and can be hard to describe (Eraut, 2004). However, previous research has illustrated the potential of the campus for informal learning about sustainability (Winter & Cotton, 2012). In a study exploring students and sustainability in HE, Kagawa (2007) describes the campus as a potential site for Education for Sustainability (EfS) through a 'sustainability orientated pedagogy of place'. Nonetheless, the impact of the informal curriculum on sustainability learning is only just starting to be explored.

Energy-saving forms an important part of efforts to enhance sustainability on campus, yet the development of students' energy literacy has received relatively little attention in the research literature. Where energy issues appear in HE, this is mainly in the context of campus greening or energy-reduction schemes, particularly in student residences. The focus of many of these schemes is predominantly behaviour change, an emphasis that may have important implications for their longer-term impact. According to DeWaters & Powers, energy literacy should empower '*students to make informed energy-related choices as they go about their daily life*' (2011:10), and should include:

- Knowledge and understanding about energy;
- Positive attitudes and values; and
- Appropriate intentions/behaviours.

Methodology

One of the aims of this study was to explore the ways in which students might develop energy literacy whilst in HE. As well as exploring their knowledge, attitudes, and behavioural intentions with regard to energy issues, we were interested in investigating the impact of the institutional environment in which students are situated, to see if there was any evidence about the impact of informal learning. Ultimately, we were interested in whether studying at a 'sustainable university' had any identifiable impact on students' energy literacy.

We developed and piloted an online questionnaire focusing on energy literacy which was rolled out to the student population at five UK universities (each in a different position in the UK Green League), then explored similarities and differences between the results from each institution to draw out implications for informal learning around sustainability (more information on questionnaire development can be found in Cotton et al., *in press*). The make-up of the sample and response rates is described in Table 1 below. There were also some differences in the disciplines represented in each university. Data were analysed using ANOVA and chi-square tests and any differences between student groups (by gender, discipline or institution) were identified.

Table 1: Sample and response rate

University (pseudonym)	Institution type	Green league position (2014)	Response rate
Shire University	New university	1-20	2.9% (N=771)
Rivendell University	Old university	21-40	14.9% (N=1793)
Dale University	Old university	41-70	3.8% (N=1175)
Gondor University	Old university	71-90	0.8% (N=183)
Mirkwood University	Old university	91-110	2.1% (N=497)

Key Findings

It is only possible in a paper of this length to give a brief overview of the findings, but key issues include the following:

- Self-reported levels of knowledge about energy were significantly correlated with scores from five factual questions, and males scored more highly both on self-reports and correct answers. However, there was a marked association between gender and discipline with males more likely to be studying science and technology subjects.
- There were significant differences in the levels of knowledge between different universities, but these were not linked to the Green League position, and seem more likely to be related to the discipline make-up.
- There were some consistent limitations to students' knowledge across all universities. For example, students were not clear on which actions saved most energy, and tended to over-estimate the importance of switching off lights.
- There was a significant difference in student attitudes (using the New Ecological Paradigm Scale, see Dunlap 2008) between males and females across all universities, with female students having a more ecological world view than males
- There was a significant difference in student attitudes between Shire (the top performing sustainability university in the sample) and the other universities. However, this

university had a higher proportion of female respondents, and thus this is likely to be a gender effect.

- There were no significant differences between the universities in the types of behaviours students were likely to undertake, which were remarkably consistent across the sample.
- However, across the majority of the universities, student attitudes significantly correlated with specific reported behaviours, such as tendency to pay more for environmentally friendly products and to switch off devices at the plug. Correlations between knowledge and energy-saving behaviours were insignificant or inconsistent across universities.
- Institutional differences were significant in responses to questions about whether the university did enough to save energy, and also on questions about whether there was enough information about energy use on campus. The percentage of positive responses to both questions increased with the institution's position in the Green League.

Conclusions

There is limited evidence from this study that studying in a 'sustainable university' impacts on students' energy literacy. Almost all variation between these universities can be explained either by the gender or discipline of the respondents. However, there are hints that targeted approaches to energy saving, together with effective communication with students, can impact on students' perceptions of their university. Universities with higher Green League positions are seen as doing more to save energy, and providing more information to students about energy saving.

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Critical thinking in HE: achievements and prospects

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Introduction

Thinking has always been an aspiration of education, from the ancient Socratic kind, through Dewey's, *How We Think*, to what is now believed a defining concept of education, critical thinking (Barnett, 1997). However, debate regarding exactly what critical thinking is, and how it should be defined, continues to be contested today. Regardless of the position taken, its importance to learning is still thought of as highly relevant, and one of the most prominent issues in education (Mason, 2007; Winch, 2010), even representative of an, '*[educational] promised land*,' (Papastephanou & Angeli, 2007:604).

The evolution of critical thinking has been particularly evident in higher education (HE), where debate regarding its conceptualisation has resulted in the establishment of its own discourse (Papastephanou & Angeli, 2007). Unfortunately, whilst the contested nature of this discourse has seemingly reached an impasse (Moore, 2011), little has been done to aid and foster its teaching, and question marks hang over the evidence of our ability to teach it, if we are able to at all (Davies, 2011).

This is a point echoed by Hammer and Green (2011: 303; 313), who state that gaps remain, '*between aspiration and teaching practice*', and that, '*design[ing] appropriate learning experiences that develop students' critical thinking skills [are] still a matter for experimentation, debate and reflection*'. This reinforces claims for further research into critical thinking, where and how it is being developed in universities (Cosgrove, 2011; Mulnix, 2012; Hammer & Green, 2011). However, perhaps these gaps come as no surprise given the complex nature of this topic.

A brief overview of the term's history highlights its complexity. The longest and most keenly contested aspect of critical thinking has been whether it is discipline specific or generic, requiring subject knowledge or transferable attributes. Whilst many distinguished writers have contributed to this debate (McPeck, 1981; Paul, 1982; Ennis, 1989; Siegel, 1990), more recent discussions have tended to not look at it from this binary perspective but on numerous levels. Barnett (1997) spoke of multiple interpretations: problem solving; critical thought; and, meta-critique. Phillips and Bond (2004) built upon the initial conceptualisations of generic and embedded skills; adding, a lifelong skill; and, critical being; with Siegel (2007) also highlighting its ethical dimension. Moore (2011) offers further interpretations: as a fault finding exercise; methodological reasoning; or, as an ethical, critical conscious quality. Evidently it remains a contested and complex concept, with the only point of agreement, that it is a good thing for students to develop (Moore, 2011). As Jones (2009) outlines, critical thinking is often spoken about in generic terms, yet is evidently understood in so many different ways.

Pithers and Soden's (2000) review of critical thinking in education highlighted a lack of research regarding the development of critical thinking at degree level. Now, some years on, there has been an increase in research activity. However, as mentioned above, this has tended to focus on definitions and conceptualisations. There still remains little in the way of empirical evidence regarding its: teaching and pedagogical or cognitive development at degree level (Davies, 2011;

Pithers & Soden, 2000; Mulinx, 2012); or, how students experience it (Phillips & Bond, 2004). Perhaps most significantly, it is the lack of studies looking at the understanding of the academic staff that is surprising.

The lack of attention into academic staff's understanding of critical thinking may be due to the disciplinary difference in how the concept is experienced and understood, which in turn leads to uncertainty regarding its pedagogy, and why it remains a troublesome concept (Moore, 2011; Ahern, et al., 2012; Hammer & Green, 2011). The consideration of disciplinary difference in critical thinking came to the fore some years ago, Condon and Kelly-Riley argued that '*no one definition of critical thinking is applicable to every discipline at every level*' (2004: 64). A point echoed by some of the most recent work in this field (Hammer & Green, 2011; Ahern et al., 2012), who outline how critical thinking will be interpreted in different ways across disciplines, with variations also in its application. Brookfield (2012) argues that critical thinking is influenced by traditions and assumptions, resulting in disciplines having alternative views on what it actually is or means, whilst Mason (2008) highlights how it also varies across cultures. All this, according to Siegel (2007), adds a multitude of 'layers', such as attitude, emotions, dispositions, habits, character traits and reasoning skills, which are all involved in education for critical thinking.

Methodology

Using an approach successfully utilised by Moore and Jones, this study will focus on listening to academic staff regarding their understanding of critical thinking, through focus groups, interviews and observations. Rather than seeking to generalise and define critical thinking, it will look into how the discourse of critical thinking is incorporated, fostered and played-out in their practice, discipline and epistemology. As such it aims to appreciate the integral but varied nature of critical thinking within and across disciplines, how it is constructed, used and taught, 'discipline knowledge in action' (Jones, 2009).

Summary

When discussing critical thinking, Mason (2007) rightly questions, how is this discourse produced, what values are associated with it, and what societal, cultural and educational issues arise from it? Answering these questions is essential if HE is really going to understand the development of critical thinking in its students. A deeper insight will be needed into what it means, for both students and academic staff, and how they experience it, which will require a much greater appreciation of the wider discourse, and the roles various agents play within that. Until this is achieved, the claims of, 'narrow' and 'flat' teaching for critical thinking (Alston, 2001) that have resulted in the 'trivialisation of critique' (Masschelein, 2004), and shallow instrumentalised reasoning (Brookfield, 2012), will become more commonplace. Unchecked this will restrict the potential of our students to become what Barnett termed, 'critical beings' (1997), or the critical thinkers that are required to be effective members of a democratic society (Harrell, 2011; Lim, 2011).

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Reflective action: forging links between student informal activity and curriculum learning for sustainability

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This paper explores how higher education institutions are seeking to build relationships between formal curricular structures and informal activity by students to enable sustainability education to engage both theoretical understanding and practical experience. The theoretical basis for the work and some of the findings were published in January 2015. The aim in this roundtable was to explore experiences of using reflective action at a whole institutional level to achieve deeper learning for sustainability.

The UNESCO GAP analysis identified the importance of moving from individual pockets of excellence to whole institution change. A number of institutions are exploring how to integrate volunteering and community action into the curriculum, such as the UCL Global Citizenship Initiative and the Sheffield Curriculum. These have tended to locate the work in a single institution-wide pan disciplinary offer within the curriculum either mandatory or optional.

In a different approach in the HEFCE Catalyst Fund project Student Capital: Green Capital the University of Bristol and UWE are jointly working on ways to engage students in community action for sustainability. The methodology being used seeks to develop a visible patchwork of engagement, rather than a uniform model, and to test the effectiveness of such approaches. In order to develop a visible, but devolved model of opportunities, with opportunities for peer review and horizontal learning, there is a need for a means of mapping initiatives within a common framework.

The Bristol Student Union's 'Get Green' four-step approach offers one such framework:

- **Learn** - empowering students to become change makers in their curriculum to ensure a knowledge base for action
- **Act** – developing positive environmental behaviour in the individual
- **Engage** – giving opportunities for students to volunteer, gain employability skills and contribute to sustainability in the community
- **Create** – supporting other students to make their own green ideas a reality.

Four key areas of challenge exist for institution-wide adoption of reflective engaged learning:

- Creating Institutional Space for reflective action
- Articulating Learning & Methodological Frameworks
- Skills framework
- Relationships

1. Creating institutional space for reflective action

Institutional culture alone is not enough on its own, but there are institutional challenges to be addressed to create space for reflective action, and to facilitate learning from it in an experimentalist governance approach. Permission is essential to remove uncertainty, encourage, confer recognition and value. Simple routes through the complexity of the institutions are needed for staff, students,

and partners – but that simplicity cannot be delivered through blueprints as each partner brings something distinct to the table.

2. Articulating Learning and Methodological Frameworks

There is a need to foster an understanding of reflective action in the curriculum, and how it differs from such things as placements, work experience, and reflective journaling, in terms of the shared development of goals and their delivery.

Appropriate drafting of Intended Learning Outcomes is critical: is the outcome sought the learning that comes from working in an engaged manner? What happens if the project fails? From that thinking about ILOs comes the design of assessment methodologies – will a reflective journal or essay demonstrate the ILOs? Or is it the product? Are there one or two products – is what is achieved in the community the outcome that is assessed or is there a separate piece for the ILO assessment?

The sorts of methodological challenges encountered in research need to be addressed – is the community subject or object? Who identifies the question? Action research/ co-production? In addition, a number of challenges flow from having ‘two masters’ with potentially different timescales, ethics, and product aspirations.

3. Skills Framework

For students to understand the rationale, a clear articulation of change agent skills is needed. It is easy to underestimate the amount of scaffolding students may need to think in the different way that reflective action requires. Students will need to have explored reflective practice, have practised interdisciplinary and group skills, and will need specific support around the ‘two master’ issue.

A core group for providing this support is fellow students – both peer to peer support, but also in the process of brokering the partnerships, where student interns have been shown to be key brokers of partnerships because of their understanding of the needs of other students.

4. Fostering relationships

This aspect offers the biggest challenges to whole institution initiatives – the articulation of sufficient long term relationships to ensure a stream of projects and opportunities. This can be extremely resource intensive, with clear but non-bureaucratic rules for engagement, ensuring all involved gain from the relationship. It requests an acceptance of risk, and a willingness to work as equals, respecting the expertise of partners, whether students, academics, community, institution or business. The concept has to be developed jointly, in a culture of co-creation, and a clear articulation of the drivers /benefits for and constraints upon all parties is needed.

Empowering students to engage in a manner that provides reflective learning has an impact. In follow up studies students reflected upon:

- Satisfaction of tangible results
- Learning to interact with new groups of people in a sensitive way
- Opening up life possibilities not previously considered
- Developing new skills
- Deeper understanding from contextualisation

- Far less solitary than research can be
- The projects were really fun
- The need for new methodologies and interdisciplinary thinking to take real-world questions
- More autonomy than an internship but under the University wing
- Benefits of and need for reciprocity
- Increased awareness of the need for reflexivity in the real world
- Builds substantial relationships with the community: reduces student transience

Participants felt the impact went beyond the particular project:

- What's the point in being in Bristol if you're not going to contribute to it?
- It breaks down in many ways the biggest problem of the ivory tower scenario: students/academics can be totally isolated from societies, losing an understanding of how society works and how the rest of the world understands things.
- By sensitising the University to it you are also making the University learn better what it is in society –encouraging reflexivity within the university and the community partners.



EDUCATION THAT PUTS LEARNING IN A GLOBAL CONTEXT...

LET'S REDISCOVER OUR JEWEL-LIKE ENVIRONMENT

SUSTAINABILITY AND VALUES

INSPIRE DRIVERS

EMPLOYER'S DEMANDS FOR SUSTAINABILITY

WE WANT Create PEOPLE WITH Flexibility



THINK GLOBAL

ACT LOCAL

OPTIMISM AND ACTION FOR A BETTER WORLD

OVER 70% OF STUDENTS EXPECT UNIVERSITIES TO TEACH THEM ABOUT SUSTAINABILITY

WHAT ARE THE CHALLENGES AND OPPORTUNITIES IN EMBEDDING SUSTAINABILITY



Community



OUR ECOLOGICAL FOOTPRINT TELLS US A LOT ABOUT OURSELVES

FUTURE GENERATIONS' BILL Create an integrated sustainable development body for Wales...

HOW DO WE BECOME A MOVEMENT?



SUSTAINABILITY AND INCLUSION

- there are many parallels



CRITICAL CREATIVES FOR SUSTAINABILITY IN HIGHER EDUCATION

"SPACES ALSO NEED TO BE SUSTAINABLE TO ILLUSTRATE SUSTAINABLE ENVIRONMENTS"

LEARNING SPACES FOR ESD



CAPTURE THE SUSTAINABILITY AGENDA

ENTERPRISE AND SUSTAINABILITY



HE SHOULD PROVIDE SKILLS FOR SUSTAINABILITY

Key competences

- SYSTEM THINKING
- STRATEGIC THINKING
- ANTICIPATORY THINKING

PLYMOUTH UNIVERSITY

EDUCATION FOR SUSTAINABILITY IN HIGHER EDUCATION

Achievements and Prospects Conference
7-8 January 2015



JAMIE ALOMBAR
HEAD OF SUSTAINABILITY,
NUS

'Students, Skills and Sustainability'



STUDENT PERCEPTIONS
OF SUSTAINABILITY IN H.E



DEMAND IS GREATER FROM
INTERNATIONAL
STUDENTS
(FOR SD COURSES)



PROFESSOR STEPHEN STERLING
HEAD OF EDUCATION FOR SD, CSF

'So far, so good... and so what?
ESD and the next decade'



ESIRE
LOGRESS
GENDR
IGH
RK...

WE EXPAND
SION OF
ISION TO INCLUDE
PLANET & ALL
- HUMAN LIFE?



MANY STUDENTS
WOULD TAKE A
FINANCIAL
SACRIFICE IN
ORDER TO
TAKE A JOB
INVOLVING
SUSTAINABILITY

THERE'S
MORE YET!

GLOBAL
RE-BOOTING
OF HIGHER EDUCATION



HAVE YOU
TRIED
SWITCHING
IT OFF AND
ON AGAIN?



A DEGREE IN SUSTAINABILITY
What's the point?

- Attract a different
kind of student

S
INABILITY)



ENERGY LITERACY
IN H.E.

Debbie Cotton



ENERGY SAVING -
IMPORTANT PART OF
SUSTAINABILITY
ON CAMPUS

I'm passionate
about the
environment
I want to
make a
difference!

HOW DO WE MAINSTREAM
ESD IN
EARLY EDUCATION?



PLAY-BASED
LEARNING FOR
SUSTAINABLE
LEARNING &
VALUES



LET'S VIEW CHILDREN AS
ACTIVE
AGENTS
IN THEIR OWN
LIVES



UNDERSTAND
SUSTAINABILITY
THROUGH A
CULTURAL
LENSE



LISTEN TO
THEIR
PERSPECTIVES

Culture is fluid, hybrid, historically situated

VISUAL MAP © ELEANOR BEER 2015

Consumerism: the elephant in the sustainability classroom

Robert Cook, Plymouth University, UK

From its wide range of definitions, we can describe 'consumerism' as not just being about having 'high' levels of consumption, but it occurs where the acquisition of goods (and services) goes beyond their functional purpose, to provide a primary route to personal satisfaction and fulfilment. We might even see consumerism as having the strength of a religion if we adopt Erich Fromm's definition: '*any system of thought and action shared by a group which gives the individual a frame of orientation and an object of devotion*' (Fromm, 1950).

Benson (2000) describes consumerism as being learned socio-economic behaviour which has changed shopping from the functional supply of requirements to a recreation. As many as 1 in 4 have problems with buying, and between 1 - 6% of the population are fully fledged 'oniomaniacs' or compulsive buyers, and this proportion appears to be growing (Benson, 2008) so that it now incorporates; '8-16% of Britain's adults; that's 8 million people' (Armstrong, 2011).

In 2007, the Pew Research Centre in the USA reported its study of the aspirations of 18-25 year olds. Their personal life objectives (1st or 2nd choices) were given as:

Getting rich	79%
To be famous	51%
Helping people in need	12%
Being leaders in their community	7%
Becoming more spiritual	4%

It is suggested that these consumerist priorities are very different from traditional human inclinations, and are heavily influenced by the effects of 'mass media' and the advertising industry (Krugman, 1971). The degree of manipulation that these processes can have on our minds was described long ago by 'the father of advertising', Edward Bernays:

In almost every act of our daily lives ... we are dominated by the relatively small number of persons...who understand the mental processes and social patterns of the masses. It is they who pull the wires which control the public mind. (Bernays, 1928)

As social norms and expectations change, then high levels of consumption become 'normal' and are also seen as the unquestioned purpose of education: '*The more you learn, the more you earn. It's as simple as that. Education is an economic imperative*' (Blair, 1997). Our physical and psychological addiction to high levels of consumption is compounded as it increasingly becomes a palliative to the personal insecurities of modern life (Myers, 2004; DeAngelis, 2004; Liedloff, 1975), and this high consumption model inevitably becomes an exemplar to the 'developing' world. Our confused and contradictory relationship with consumption is even reflected in the most seminal pronouncements on sustainable development:

Above all we need to generate growth ... This growth must be based on policies which sustain and expand the environmental resource base (WCED 1987:40).

Such growth was seen as a fundamental problem for sustainability from much earlier, as in the I=PAT equation (Ehrlich-Holden, 1971) where I=Impact, P=population, A=affluence, and T=technology. Economic growth (with population increase) is thus seen to underlie environmental decline (Princen, 2002; Myers, 2004).

A significant inverse correlation has been shown between materialistic values and pro-environmental behaviour (Hurst et al., 2013), and such studies have led to the ethic of growth and consumption becoming, for many, the dominant problem for sustainability: *'The greatest threat to the West and the Western world isn't terrorism but consumerism'* (Porritt, 2007).

In keeping with educational inclinations, however, the ESD classroom is becoming increasingly skills-focused, and is dominated by concepts such as critical thinking, systems thinking, global thinking, anticipatory thinking, strategic thinking, and so on. One might easily consider these useful skills as essentially being just 'good education'. Personal action tends towards involvement in conservation, green purchasing, or 'responsible consumption'. The implicit message is thus technocentric – suggesting that conventional human desires and consequent socio-economic structures need relatively minor adjustments rather than fundamental reformulation.

'Consumerism' is less considered in ESD. This may be because of a fear of appearing prescriptive. Bob Jickling (2014) highlighted this dichotomy in ESD by suggesting that using education as a tool to advance a particular outlook; *'is repugnant to the development of autonomous and critical thinking'*. It is more appropriate then to treat sustainability like any other subject for study. But ESD is different – it is a problem as much as a subject to be studied.

A second problem in teaching about consumerism is that it is then accompanied by the inevitable and uncomfortable solution that is personal frugality. The difficulty in living up to such standards for both educators and institutions are enormous, immediate, and unpalatable. So it is easier to adopt a distant, theoretical, and technocentric response to environmental decline. Even if we don't really believe it!

What, then, could we do? I would suggest that the following are principles that we might usefully follow:

- Focus on the 'unsustainability' of current systems rather than 'sustainable' options (the latter being like seeking a cure for a disease rather than understanding its causes).
- Speak less about buying 'differently' (Fair Trade, organic etc.) and more about buying less (using the WWF 'One World' concept, and environmental footprint models).
- Understand the nature of our basic needs; how they were traditionally met, and are conventionally (not) provided for. (Price, 2010; Hodgkinson, 2009).
- Educate for wellbeing – what makes you truly happy? (Belton, 2014) – and Happiness as an internal condition (Meditation / Mindfulness etc.).
- Experience alternative systems and socio-economic structures, for example, low impact living (Cook and Cutting, 2014), Transition Towns, frugalism, 'stable' or 'no growth' economies (Daly, 1991; Jackson, 2009).

Implicitly and explicitly, education does indeed promote many values that it considers worthy, such as 'freedom', 'democracy', 'fairness', and so on. The urgency of our environmental predicament

demands that we promote values that are conducive to human wellbeing, and so values that unquestionably undermine that wellbeing, such as 'consumerism, must be confronted.

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Embedding sustainability through systems thinking in practice? Some experiences from the Open University

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Introduction

Systems thinking and practice have long been recognised as a key part of education for sustainability (EFS) (Vickers, 1980; Ison 1990; Smyth 1992; Blackmore & Ison 1995, 2012; Blackmore & Smyth, 1998, 2002; Sterling 2003, 2010; Bradbury, 2007; Blackmore, Ison and Reynolds, 2014). Developing an appreciation of interconnections, multiple causes, counterintuitive effects, and unintended consequences in messy and complex situations is essential to being able to act in our climate change world (Ison, 2010; Reynolds and Holwell, 2010).

Higher Education (HE) presents many challenges and opportunities for EFS (Ali Khan, 1995; Sterling and Scott, 2008; Bawden, 2009; Tilbury 2011) both for students and for staff:

- (i) institutional constraints leading to entrenchment of disciplinary boundaries and assessment strategies with summative rather than formative evaluation;
- (ii) policies and initiatives that have enhanced and constrained EFS - regarding interdisciplinarity and transdisciplinarity and higher educational institutional (HEI) practices;
- (iii) the market-led nature of HE that strongly influences what and whose values come forward in HE.

Several of these aspects have also enhanced or constrained systems thinking in practice (STiP) in HE curricula, which transcends disciplinary and traditional HEI evaluative and market boundaries.

Background - Systems thinking in practice at the Open University

The UK's Open University (OU) provides supported open learning opportunities for students from over 130 countries. It is the UK's largest university, predominantly a part-time education provider. Over 70% of OU students both work and study.

The OU Systems group (formerly department) has applied STiP in both teaching and research for over 40 years. It provides systems, environmental, and development qualifications with systemic and sustainability elements integrated in other qualifications, and also the design of sustainable higher education teaching models (Caird et al. 2013; Lane et al (2014).

One particular initiative, led by this paper's authors, is the OU's postgraduate STiP programme. This initiative has since 2010 developed ideas and resources used at undergraduate level and met demand from OU STiP alumni to progress to postgraduate qualifications. This STiP programme is designed to develop students' abilities to tackle complex messy situations, work more collaboratively to avoid systemic failures, and provides skills to think more holistically.

Three key features of the core STiP modules are (i) Epistemic understanding. 'Systems' are used as conceptual models, as epistemological devices rather than ontological realities. (ii) Active pedagogy. Students use their learning context in creative combination with tutors and module designers. (iii)

Design praxis. Students develop projects using systems concepts in a constructive, reflexive, design-mode manner favouring formative evaluation (Blackmore, Ison and Reynolds, 2014).

STiP has attracted students from a wide range of public and private sector professional backgrounds including public health, countryside planning, landscape design, project management, engineering, energy industries, community development, and social work. Students have worked for councils, business, industry, and non-governmental organisations. Academic backgrounds range from information systems to engineering to health and social care to environmental sciences to development studies.

Core STiP modules are combined with optional modules for STiP certificate, diploma and Masters qualifications. STiP modules are also options in Environmental Management and Development Management and other qualifications. Around 1000 students have registered on the core STiP modules, mostly from the UK/Europe.

Findings - Students' experiences of STiP

Understanding how students experience STiP, and how they use it, is an iterative process, both during module presentations and subsequently. Critical reflections on the modules occur in student discussion forums. Students' assessed projects provide examples of their experiences. Most OU students identify work-based situations for their projects, though some use instead community or other group bases. The ideas and methods students use in projects come largely from the STiP modules. Students' perspectives are grounded in their experiences as practitioners. Several have published their inquiries and insights (e.g. Wilding, 2012; Robinson, 2013; Bailey, 2014). Evaluations underway include a scholarship review project examining student recruitment and retention, a review of online forum use and critical reflection on the role of STiP in EfS. A diverse, active and critical OU STiP alumni community has developed, initiated by early graduates of the programme. STiP academic staff participate in this community's deliberations, at the invitation of student alumni. A self-organised LinkedIn on-line community of over 400 STiP alumni is central to this community of systems practice.

Discussion - STiP and EfS issues arising

EfS is part of students' engagement in situations – through ideas, methods, values and assumptions of the practitioner, the nature of the situation or emerging from the process as a whole. But students have choice about which ideas, methods and situations they use. Sustainability might or might not be apparent. Students' institutional contexts, practice domains, interests and values vary. As STiP academics our perspectives include elements of EfS but our students do not necessarily develop their STiP competencies for the purpose of EfS. Indeed, many come from backgrounds where sustainability differs from what we would recognise in EfS. As critically reflective educational practitioners we reflect-in-action as we present the STiP programme and reflect-on-action (after Schön) with our alumni and associate lecturer community. Some of our students are clearly developing skills and understanding of relevance to systemic change and sustainability. But as students' learning for STiP is grounded in their experiences and strongly influenced by their institutional worlds, they do not always choose to include EfS. We can see the potential of STiP in EfS but step back from a position of advocacy and instead are more critical of our own practice, recognising what is constraining and enhancing EfS in this context.

We are using STiP methods and heuristics to understand what students are experiencing in their study of our modules, what it is part of for them and how the STiP programme can best contribute to EfS. We are developing our recommendations on the role of STiP in EfS will follow.

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Higher Education for sustainability and the future: how do we foster graduates' anticipatory competence?

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Introduction

Wicked problems are those that are seen to involve many stakeholders, have not one cause or effect, and show complexity, such as climate change and soil erosion (Sandri 2012). Institutes of higher education have been called upon to develop sustainability competence in their graduates to tackle these problems (Dentoni, *et al*, 2012; UNESCO, 2012). By using a competence approach to develop a higher education course entitled 'Sustainability and the Future', this researcher has begun an action research cycle to inform their own practice on how best to engage students on sustainability issues and explore their own perceptions of the future. In particular, through reflective journaling, this researcher aims to develop a theoretical model of students' anticipatory competence (Wiek, Withycombe *et al*, 2011, Rieckmann, 2012) and how this can be fostered in higher education.

Background

Competence is an oft-disputed term, but here refers to a holistic outcomes-focussed view of education. One is deemed competent by the concerted use of a mélange of knowledge, skills, dispositions and other factors to successfully perform a task or demand (Rychen and Salganik, 2003). Some refer to this overarching outcome for successful graduates as sustainability literacy (Stibbe and Luna, 2009) others as capability (Thomas and Day 2014). The question remains as to what sustainability demands should graduates be able to fulfil? To begin answering this question, researchers typically break sustainability competence into smaller sub-competencies to better classify the tasks. One key sub-competence in sustainability research and problem solving is anticipatory competence (de Haan, 2006; Wiek, *et al*, 2011; Rieckmann, 2012).

Hidalgo and Fuentes (2013) write that 'the specification of key competencies for sustainability and their incorporation in a set of general or basic competencies is a requirement for the elaboration of new universities' curricula'. Savelyeva and McKenna (2011) highlighted three main movements that allow for the promotion of sustainability - campus greening, education for sustainability, and research. In this paper, the researcher targets anticipatory competence as a key competence for Higher Education graduates by delivering a course on sustainability that uses the lens of futures studies methods and activities called 'Sustainability and the Future'.

Approach

Through undertaking a practitioner role in the teaching of a course in 'Sustainability and the future' in the University of Vechta, Niedersachsen, in Germany, the researcher has begun an action research inquiry cycle into the role of anticipatory competence as a key sustainability competence and its operationalisation in higher education. The question being, how do students develop their anticipatory competence through the running of the above course?

To develop a theoretical model of anticipatory competence, a triangulation of methods is being used. The researcher has reviewed current literature spanning futures studies and sustainability education

inter alia (Dator, 2002; Bussey and Inayatullah, 2008; Wayman, 2009; Slaughter, 2009) and used this review to develop a preliminary operationalisation of anticipatory competence. The review also led to the development of the course 'Sustainability and the Future' (SATF). By developing '*non-linear teaching strategies that embody the experience of the future for students*' (Bussey and Inayatullah, 2008) and a curriculum '*inspired and informed by idea of the triple bottom line*' (Johnston, *et al*, 2012) and valuing future generations (Patterson 2013), SATF explored aspects of futures studies (for example, backcasting, timeline development, and scenario planning) while also covering the fundamentals of sustainability discourse (systems thinking, planetary boundaries, international agreements, and sustainability design approaches such as permaculture and transition towns).

In an action research inquiry cycle (McNiff and Whitehead, 2009), the researcher took on a practitioner role and delivered this thirteen week course using Efs pedagogy, while getting students to document their own perceptions of their anticipatory competence through reflective journaling. Through content analysis of the learning journals, the researcher developed a baseline coding of how students see their own anticipatory competence (Moon, 2006). The first stage of content analysis is reported here.

Key Findings

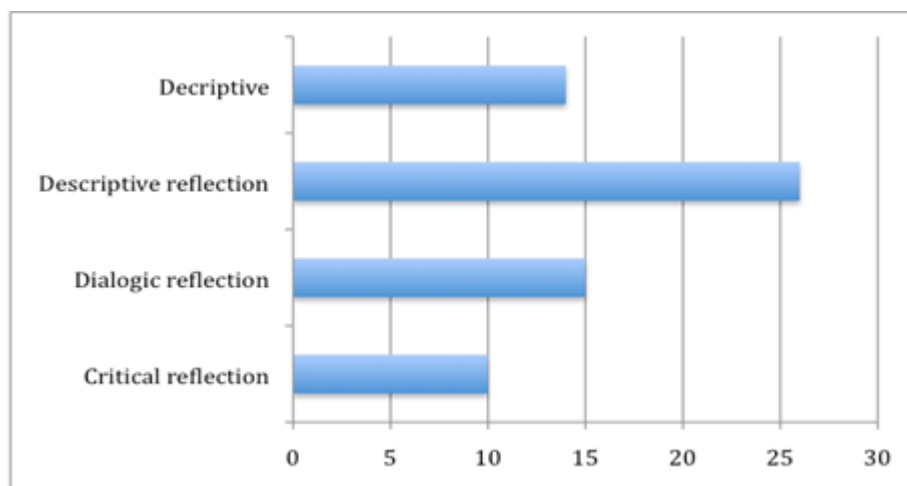
Thirteen Social Work students took part in the course in the first semester with over 83 journal entries. This first cycle's journals have since been analysed and their perceptions of anticipatory competence compared to the literature. Knowledge and skill components that were coded in the journals included:

1. The present sustainability of society
2. Dealing with uncertainty
3. Alternative futures – knowledge of possible and plausible futures
4. Futures methodologies – Risks, Backcasting, Forecasting, Scenario

Specific knowledge relating to the course content (e.g. knowledge of peak oil) was coded according to levels of reflection (see table 1 above). Overall 79% of students' entries were found to have at least high levels of descriptive reflection (see graph 1).

Table 1: Reflective writing in journals (from Moon, 2006, p. 118)

Descriptive writing	Just describes the event or paraphrases a reading.
Descriptive reflection	Description but with some justification and the consideration of possible alternative viewpoints
Dialogic reflection	An ability to step back from events – analytic and integrative
Critical reflection	A deeper awareness that actions and events are located in and influenced by multiple historical and socio-political contexts



Graph 1: Levels of reflection in learning journals in student cycle 1

As well as knowledge components students also highlighted the following affective attributes as of particular importance in anticipatory competence:

1. Personal hopes and fears for the future
2. Valuing future generations
3. Valuing global justice
4. Valuing nature

Discussion

Students responded well to scenarios and timeline exercises, and noted that their creativity was engaged. The biggest complaint in these sessions has been the lack of time in-class to fully explore these concepts.

Having over 79% of students journal their knowledge in a descriptive reflection or deeper is heartening, especially owing to language constraints. The course was held in English though not all students were fully proficient. Owing to the constraints of the first results of an ongoing action-research inquiry cycle, it may be hard to draw conclusions just yet as to one class's own perceptions of their anticipatory competence. Hicks (2008) states in addition to knowledge, understanding and skills for the future, good futures thinking should also address hopes and fears, which can influence decision-making, which the journal entries did mention. Specific activities were often highlighted as particularly effective in exploring feelings like hope, such as scenario modelling

(The scenario activity) made me think of the plan-ability of future and underlined certain things in my mind: the future is also influence-able. I have to do more to change what is facing us if the world keeps wasting minerals, migration to unstable city structures becomes uncontrollable and if climate change leads to an overall change, also my personal lifestyle. I want a world that also gives our future generation the chance to create their individuality without major difficulties. (Student 8, Cycle 1)

As can be seen in the example above, the last sentence clearly states a value of the rights of future generations. Through code analysis such blocks of text can show a thought progression connecting valuing future generations and behaviour and hope. Other aspects intersections of codes were frequently also the opposite – connecting fear and feelings of powerlessness.

Conclusion

This is an interesting first step in developing a theoretical model of anticipatory competence. In a small class students were able to make clear connections between their own behaviour and valuing future generations. The next stages of this triangulation of methods (Denscombe, 2008) have been holding focus groups with students and conducting two sets of expert interviews with both education researchers and sustainability practitioners to create a 'job analysis' of anticipatory competence (Sadler 2013). It is also planned for a further three semesters of the SATF course to compare data and improve the practitioner's own practice.

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Interdisciplinary approaches to sustainability education – learning from student voice

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Introduction

Increasingly it is being recognised that the objectives of Education for Sustainable Development (ESD) require a constructively aligned pedagogy that is interdisciplinary, deliberative and active (UNESCO 2012, QAA 2014). This is in order for Higher Education to develop graduates equipped with the critical and creative attributes to be resilient and innovative in the face of pressing issues of global crisis, the extent of which transcend international boundaries and stretch across generational periods of time. Radical changes are currently being made to the role and function of HEIs (Light et al 2009). This reform is informed by theoretical developments in how people learn, and effective teaching practice (Illeris 2009). Strands of this reform are also informed by emerging theory and practice around all educational institutions needing to address the challenge of enabling a ‘world ready’ citizenry who are informed and equipped for sustainable development in the 21st Century.

Plymouth University is responding to this call through a variety of teaching initiatives, but what is currently lacking is a deeper understanding of how these innovations and reforms are working from the students’ perspectives. The Centre for Sustainable Futures (CSF) was established at Plymouth University in order to support academic staff and students with innovation in ESD pedagogical practice that is interdisciplinary, deliberative and active. A key objective of CSF has been to conduct pedagogical research into new ESD modules, with a particular interest in capturing student experience in order to inspire staff development and prompt future change in practice. This paper reflects upon research conducted through a partnership between the Centre for Sustainable Futures and staff and students from the Plymouth Business School (PBS). It focuses upon a new Year 2 undergraduate optional module in PBS that considers aspects of sustainability through an interdisciplinary pedagogical approach. The research has sought to develop a hybrid action research /lesson study approach in order to understand students’ experiences of learning through this module more deeply and to identify where future improvements could be made.

Headed up by Hugh Conway, this Year 2 optional module is interdisciplinary by having sessions taught by a team of seven staff; looking at the concept of sustainable organisations through a range of fields of expertise (e.g. marketing, human resources, economics, business operations, accountancy and entrepreneurship). This module aims to offer a deliberative and active pedagogy, with each teacher delivering a block of three sessions with opportunity for student discussion, world cafés, problem based learning, collaborative group work (including an assessed poster presentation), and independent study (freedom to choose focus and format of second written assignment).

On paper, the course is an excellent exemplification of what the ESD literature is calling for, but what have been the students’ experiences? CSF has worked in partnership with the module staff team through a broad participatory action research strategy. Data collection techniques used to capture students’ perspectives on their experiences have drawn specifically from lesson study research methodology.

Findings

The student focus groups, end of module evaluation workshop, and one to one interviews have revealed a number of important insights into students' experiences including:

Comparatively there is something qualitatively different about this module. Students across each data collection activity spoke positively about the deliberative and active pedagogy of the course and the positive impact this has had on their learning:

Feels refreshing to learn from other students rather than just being told what is right or wrong by a lecturer.

Out of my six modules this year, this is the one I've learnt the most on because it's more for what you want to do rather than you've got to learn this for exams.

The dialogic nature of teaching is changing patterns of student engagement.

The students participating in the research spoke of a number of impacts upon their learning approaches:

You don't necessarily realise that you're learning at the time, but then when you go away from it, you've got what you've subconsciously absorbed from the session. It's actually quite amazing compared to what I would have had if I had been taking notes. Because it would have been on the notes, not in my brain.

I always refer back to that one lecture when we had the debate.....and just the way he ran that by not talking and letting us carry on and I've just never been in a lecture like that before..... I think that's going to be like a lecture that you'll always remember throughout my life.

For some the course has been transformative. A number of participating students spoke of the module being a life-changing experience with a new-found interest in aspects of sustainability:

I always had a little bit of inkling for sustainability but didn't really know much about it..... I feel that now I have so much more knowledge. Things that I'd heard about but didn't really know what they were, like circular economy... I wouldn't have had a clue what that was before. Now I feel that I've got such big knowledge and so many things I can talk about.

Almost makes you feel contempt for current practices and norms and for the allowance for this wasteful practice to continue and progress so far. It has encouraged the pool of thought that it is through collective action rather than dependence on businesses/ Government/ organisations to change and that a cultural shift in regards to sustainability is imperative.

Implications for future practice

The findings of this research have been used to provide inspiration for future change in practice by the module team in partnership with CSF. Areas of consideration for future improvement include:

1. In the early stages, how can we provide more of an introduction to, and support for students accessing, this new interactive, collaborative and issue-based pedagogy? In particular, how can we equip them to learn note-making approaches suitable for dialogic engagement?

2. How can we respond to students requesting that the module's real world learning objectives require more real world learning spaces – how can community engagement be enhanced further?
3. How can we address the critical tension between the course wanting to be interdisciplinary and also valuing student autonomy? Is there a need in this module to constructively re-align the main assessment task in order that it is more fit for purpose with regard to capturing the intended interdisciplinary learning outcomes (Biggs and Tang, 2007)?
4. How can a new workload model be explored that recognises the importance of a 'learner facilitator' on team teaching based modules who serves as a regularly present staff member, helping students to make the links between and transitions across one disciplinary area to the next?

Conclusion

Despite the limitations of this particular action research/lesson study project, it points towards the professional development opportunities for staff to develop research informed teaching practice through conversational narratives with their students. It represents a pedagogical research approach that is essentially based upon partnership with module teaching staff and students in order to advance interdisciplinary, deliberative and active pedagogical approaches. And in so doing the hope is that collectively we will be able to discover new ways and means to effectively 'walk the talk' of ESD.

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